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Subsurface Congestion Has Become An Acute Problem in New York

Condition is Steadily Growing Worse—1,450 Miles of Gas Mains in Manhattan Island—Average Maintenance Cost About $516—Congested Conditions Makes for an Increased Expense to Companies

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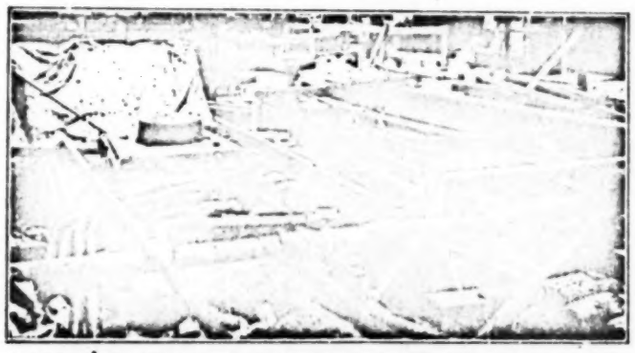
The question of providing for underground public utilities in New York City has generally been considered of minor importance and has been left largely to the owning companies themselves, without any plan, system or assignment of space in the street whatever. As a result conditions have now reached an acute stage



UNUSUAL STATE OF CONGESTION EVEN FOR NEW YORK

with a congestion underground comparable to the congestion on the street surface, and which, likewise, is more apparent at the street intersections.

That this condition is gradually, but steadily and positively growing worse, a review of the last fifteen years will show. Since 1900 additional ducts, Croton water and gas mains, and the high pressure fire system have been laid.

With the increased density of population the older structures have become inadequate and sizes have been increased. Likewise, the difficulties and expense encountered in restoring utilities have increased, not only on account of this necessary increase in size and number, but also because subways are being built in the older and more congested streets. The problem warrants grave consideration, for it is not adequate to provide additional transportation facilities and exclude a corresponding increase in water, sewers, gas, electricity, telephone, etc.

Present Conditions Due to Indiscriminate Installations

The present conditions underground are due partly to the indiscriminate laying of structures in times past and partly to a duplication, as a result of competition, of structures serving the same purpose. This duplication is most noticeable in the case of gas mains. For block after block 4, 6, 8, 10 and even 12-in. mains are found in a street, belonging to some or all of the four gas companies operating in Manhattan. Also, in many of the streets, there are often three or more mains belonging to the same company, which range from 4 to 16 or 20 in. in diameter.

The Consolidated Gas Company distributes gas over the entire island of Manhattan, the Standard Gas Company from 13th to 135th Streets, the New Amsterdam Gas Company from Henry Street to 135th Street, and the Mutual Gas Company from the Battery to 64th Street.

The Standard and the Mutual gas companies do not occupy all of the streets. As would be expected, the greatest duplication is found in the area between 13th and 64th Streets.

The mains are not laid in straight runs but are offset back and forth, often from one side of the street to the other without reference to an economical use of the space between curbs.

In restoration the Public Service Commission is limited to a purely physical proposition, that of restoring the property as far as possible as it is found, with only such changes as physical interference with the subway structure make necessary. In any event, an equivalent service must be provided.

NETWORKS OF SUBSURFACE-STRUCTURES LIKE THIS BY NO MEANS RARE IN NEW YORK

There is probably not a more congested underground condition in any city than that which exists in Broadway between Seventeenth and Twenty-fourth Streets. Restoration here, besides being excessive in cost cannot be done in a satisfactory manner owing to the size and number of structures,

With curb lines but 37 ft. apart there are 17 pipes, 8 of which are gas—4 belonging to one company—4 banks of electric ducts ranging from 6 to 48 holes each, and two underground trolley tracks.

The total sectional area of pipes only is about 25 sq. ft. Including duct banks would increase the area to 48 sq. ft. With the prisms of the two car tracks added it would be 74 sq. ft.

At the intersecting streets, each of which brings in a considerable number of mains and duct banks, the space left for backfill, after the new subways are built, will be even less. Seventeenth Street adds 12 sq. ft. to the above areas, Eighteenth Street 21 sq. ft., and Twentieth Street—which is about the average—6.6 sq. ft. To restore these structures, it will be necessary to crowd them together or place them one over the other, and in either condition it will be impossible to get below them.

Mileage of Mains in City

There are approximately 1,450 miles of gas mains in Manhattan on about 500 miles of street, and about 800 miles of water mains, not including 100 miles of high pressure mains. Of this 1,450 miles of gas mains, 200 miles are larger than 12 in. in diameter, leaving 1,250 miles of mains 12-in. and under which may be classed as service mains. Thus it appears that there are nearly three gas mains per mile of street, or two and one-half service mains per mile of street; but, in this connection, it should be borne in mind that there are many miles of streets in which there is only one service main.

Of this 1,450 miles or less of mains about 825 miles belong to the Consolidated Gas Company, 250 miles to the New Amsterdam Gas Company, 200 miles to the Standard Gas Company and 170 miles to the Mutual Gas Company.

The Consolidated Gas Company supplies more than 20,000 cu. ft. of gas per mile of main, while the other three companies supply a little less than 11,000 cu. ft. to each mile of main, so that the revenue per mile of main is nearly twice as great in the case of the Consolidated Gas Company. Many buildings are connected to one main belonging to each of the companies occupying the street.

Some years ago it was found after investigation that 60 per cent of the street openings are for services. The operation and maintenance of mains and services makes necessary the opening of pavement and the digging of trenches. It is almost impossible to backfill these openings properly and it is impossible to restore the pavement to its original condition, with the result that the pavement settles and leaves the street in a dangerous condition.

The average number of street openings for the years 1911-12 and 1913 was 28,000, but the number has been decreasing for some years. In 1913 there were 26,733 permits granted, of which 7,166 were in sidewalks, and 19,567 were street openings. Deducting plumbers' permits leaves 15,481 corporation permits, of which 8,158 (more than one-half) were for gas mains. Out of a total of 9,184 permits for repairs 7,192 were issued for gas mains or services. During the year, 42,690 ft. of mains were overhauled.

66,000 Sq. Yds. of Pavement Restored

In 1912 the amount of smooth pavement restored by the gas companies for street openings was more than 66,000 sq. yds., or over 50 per cent of the total yardage restored by all companies for street openings. Probably there was about an equal amount of stone block pavement similarly restored. This amounts to about 7½ miles of ordinary 60 ft. street.

The reports of the gas companies show a six-year average maintenance charge for all companies in Manhattan, of about $516 per mile of main, and unaccounted-for gas to the amount of $309. The average maintenance charge in the Bronx for the Northern Union and the Central Union Gas Companies is less than $200 per mile, while for the Brooklyn Union Gas Company the amount is $300 per mile. The maintenance charge per mile for services in the Bronx is less than half that in Manhattan.

The conclusion to be drawn from this data is that the congested condition of the street subsurfaces makes for an increase in the cost of maintenance to the gas companies, in addition to the expense which the city has to bear in the matter of pavements depreciated or ruined.

It would seem urgent, therefore, that unnecessary structures be removed and a less expensive and cumbersome method of maintenance and operation be devised. The cost of maintenance of all structures, as well as pavement, is increased by present conditions.

As the congested traffic conditions and the maintenance of pavements have forced the abandonment of unnecessary railroad tracks on the surface, so do the unnecessary and useless structures underground force the consideration of their abandonment. The time has come when all structures not being used or not needed by growth should be removed by the owning company. For the city, this would reduce the cost of restoration, leave more room for other necessary structures, give space for repairs to sewers, water mains, etc., and reduce the cost of pavement. For the gas company it would reduce the maintenance charge, the loss due to unaccounted-for gas, the fire and explosion hazard and the amount on which a revenue must be earned.

It would result in better pavements generally, less interference with business and traffic, fewer complaints, less leakage on both water and gas, easier and cheaper repairs to gas and water mains and all other structures.

Future Uses for Subsurface Spaces

Pneumatic mail tubes were put in the ground about 17 years ago, steam pipes about 35 years ago, and electric conduits less than 30 years ago, all well within the active part of a lifetime. Who shall say that in the future there will not be some other conveniences found that will require still more underground space, conveniences or necessities not known to-day, any more than steam or high pressure fire services were known forty years ago. Refrigeration, the Catskill Water Supply and larger mail tubes are already seeking space in certain portions of the city. May there not be some underground means found for the disposal of ashes, garbage, etc.? Assuming this to be the case, where will such structures be placed?

A study of the duplication of structures causes one to ask why it exists and to seek some method of elimination.

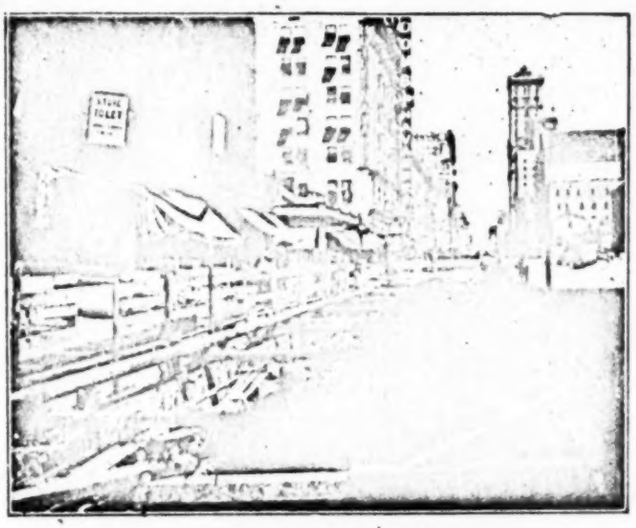
The reason for the duplication in gas mains is that the city has in the past granted no less than eleven separate franchises for the manufacture and supply of gas. Many of these franchises overlapped, most of them were not exclusive, and few were revocable. Mains were laid under most of these franchises, and the resulting competition ended in a "gas war," and, in 1884, the combination known as the Consolidated Gas Company. The six companies forming the Consolidated Gas Company were in order of the granting of franchises: The New York Gas Light Company, the Manhattan Gas Light Company, the Harlem Gas Light Company, the Metropolitan Gas Light Company, the Knickerbocker Gas Light Company, and the Municipal Gas Light Company.

The Equitable Gas Light Company and the East River Gas Company are, by merger the New Amsterdam Gas Light Company, which, with the Mutual and Standard Gas Light Companies, are controlled by stock ownership by the Consolidated Gas Company. The original New Amsterdam Gas Light Company had no franchise and the Consolidated Gas Company acquired its franchises through the consolidation or through controlled companies or interests.

In 1876 the Board of Aldermen passed a resolution granting rights over the whole city to all incorporated gas companies under certain conditions. Later, some doubt appearing as to the authority of the board under the conditions, the Legislature, in 1885, legalized the action of the aldermen and thus we have to-day eight of the original franchises granted by the city or the Legislature, some of which had expired, with probably perpetual rights over the whole of Manhattan, confirmed by legislative action. The franchises of the Standard Company and the New Amsterdam Company as the owner of the East River Company, appear to give practically the same rights as those confirmed by the Legislature in the case of the other companies. One franchise seems to have disappeared, probably because it confers no rights not covered by other franchises. As stated above, mains were laid under most of these franchises, and with the resulting complex network of piping, pressure regulation is very difficult.

That at least some of these mains are useless is proven by the fact that in our subway construction all have been killed and the usual service is, and has been, for from one to three years supplied by two mains in the gutters, and no complaints of lack of pressure have been made to the Public Service Commission. At present, on account of our limited authority we are spending an excessive sum of money to restore these useless mains with no benefit to the contractors, the owners of property, the city or the

public. The contractor seldom makes any profit from the restoration, the owner of the property does not get a more favorable location for his main, the public gets no better service, the city gains nothing, as it is no nearer a solution of the underground



REPLACING GAS MAINS OVER NEW SUBWAY

problem, and the cost of restoration is multiplied by the amount of duplication. This represents conditions as we find them to-day, and similar conditions prevail in Boston, Chicago, and other large cities in the United States and Europe.

Points Out What Gas Industry Has Done for England

"Ingratitude often shows itself where least to be expected and it surely comes with bad grace from a government department,—forgetful, or perhaps totally ignorant, of the help rendered by the gas profession in the manufacture of explosives for war purposes—to suggest an arbitrary reduction in the output of gas, and even go so far as to give the percentage they desire, entirely overlooking another fact—that, more and more, as munition works become completed, will gas be required for the furnaces and tools used in turning out war material," stated John C. McMillan, retiring president of the Waverly Association of Gas Managers, in his presidential address, at the Centenary Meeting of that association, held recently at Edinburgh, Scotland.

"The gas profession has risen nobly to the occasion of its country's peril in its unremitting efforts to take on a new work—the extraction of toluol—as also in the great amount of judicious distribution (where the output of the existing plant was strictly limited), so that, while meeting all reasonable domestic and public requirements, the nation's needs in its workshops have been met as required.

"Another benefit, too, the gas industry has been able to further, owing to the war, is smokeless fuel. In addition to heating and cooking by gas, can now be added the more general use by the public of coke for domestic purposes, still further conducing to the purity of the atmosphere. Enforced daylight saving may, by some, be considered as prejudicial to our interests, but no doubt it will only serve as an incentive to us to redouble our efforts to increase our day-load for cooking, heating, power, and industrial purposes.

"When the war is over and we are able to look back with proper perspective on the development of the gas industry in munition service, and in countless other ways, we will be surprised at the great progress made.

"If we were somewhat lax in our scientific research before the war, we will, no doubt, in the light of what has happened, redouble our efforts—and let us hope that, in after years, it may be found that it was but the beginning of greater strides in our own industry as well as in many others in our land."

Problem of Laying Mains and Distributing Gas Has Risen to Great Importance

H. M. Riley, Points Out Fact That New Methods Are Cropping Up Almost Over Night and That Old Ways Are Slowly, but Surely, Fading Indistinctly into the Past

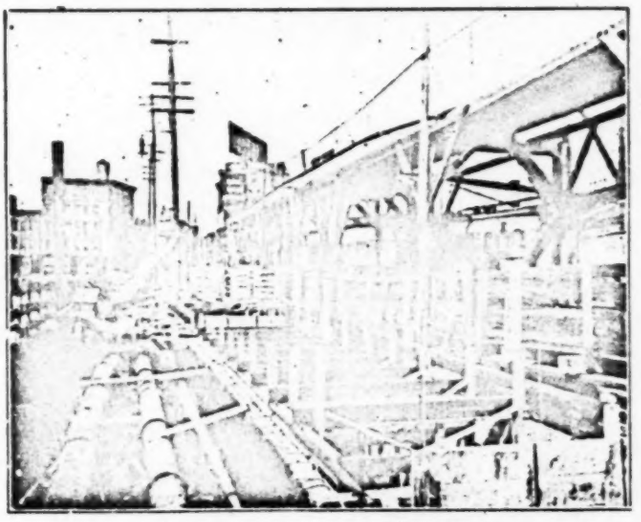
Problems are being encountered to-day in the distribution of gas such as gas men in bygone days did not anticipate even in their wildest dreams. The new problems will have to be solved by different methods than those hitherto in use. H. M. Riley, assistant superintendent of distribution, Gas Operating Department, Consolidated Gas, Electric Light & Power Company of Baltimore, discusses the question as follows:

Giant Strides Made in Distribution Work in Past Ten Years

When one considers the giant strides made during the past 10 years or so by gas companies, along the line of distribution work, it seems indeed incredible that we are both literally and figuratively carrying to the very hearth of the customer a commodity whose origin dates from the time when our own country was in "knee breeches."

With the gradual development of the gas industry the old order of things has changed, and probably more so for the distribution phase than for any other.

A hundred years ago the manufacturing plant was naturally the thing of greatest moment in gas work. Pipes, of course, had to be laid for distributing the gas, but the general accuracy of the system in regard to the proper sizes to use, etc., depended rather



MAINS RELAID ALONGSIDE SUBWAY

on a qualitative estimate, most probably, of some foreman. Such rule-of-thumb methods probably prevailed for many years, and the different successive foremen's different ideas more than likely tended to complicate gas-piping systems.

From Present Day Gas Engineer Will Be Occupied for Most Part with Problems of Distribution

To-day the proposition is of an entirely different nature, for, through thorough scientific engineering and distribution departments, the problem of laying mains, and in general, of distributing gas, has risen to a position of great importance, so that we can conservatively state that, from the present day on, the gas engineer will be occupied for the most part with problems of transmission and distribution.

If we consider the distribution of gas from the broad standpoint, and if highly efficient work is to be carried on by a gas company, its distribution department should be, at the least, liberally broad, as the domain of utilization of appliances is entered. Here at once problems are encountered which the gas men of bygone days did not anticipate in their wildest dreams, and a distinct avenue of investigation and study opens up, which sooner or later must be, if intelligently, handled by testing and research laboratories.

New Problems Presented

Turning our thoughts in still other directions, the problems of higher pressure versus larger mains, likewise welded steel pipes, choice of many varieties of meters, etc., confront us and require extremely intelligent attention in order to be properly solved.

In short, new methods in gas distribution are cropping up almost over night, and slowly, but, nevertheless, surely, the old ways are fading indistinctly into the past.

Old Ways were Necessary

But the old ways were necessary, and, like the pile driven deeply to bed rock, serve as a solid foundation on which our present-day efficient gas organizations have been reared.

Fortunate it is for those companies who have still in their employ gas engineers whose span of business life stretches back 30 or more years to the days of rule-of-thumb methods, but who have had the foresight, as time passed and new ideas came into being, to keep their vision always in the van of progress and directed ahead to the present day, so that they stand in our industry as the staunchest exponents of technical methods in gas distribution work.

American Gas Companies Free of Meter Difficulties Such as Now Trouble English

It was brought out, in the recent preliminary report of the joint committee of the British Institution of Gas Engineers and the Society of British Gas Industries to investigate the various conditions affecting the life of gas meters, that the American gas companies are free from the troubles that are being met with in England in regard to the life of gas meters. Such troubles did exist in the United States, however, some ten or fifteen years ago. In commenting on the matter, Dr. R. Lessing, the chemist of the joint committee, expressed the hope that he might find some explanation for the difference in conditions by an examination of a number of American meter liquids and samples of meter parts.

"The factor which contributed more than any other to the improvement in conditions in the United States," he stated, "was the formation of a combine of the most important firms of meter makers for the purpose of standardizing and centralizing the manufacture of meter parts.

"They were thereby enabled to have one factory attending to the manufacture of all mechanical parts, and to run their own tannery for the purpose of making diaphragm leathers only.

"This latter point appears to be of great importance, since British meter makers are, for the purchase of diaphragm leathers, almost entirely in the hands of foreign and colonial tanners, who are not cognizant of the requirements of this special application of leather, but supply a general market."

Effort Being Made to Establish Dye Industry in Holland

There are only two small coal-tar distilleries and three small coal-tar color works in Holland, which has depended almost exclusively upon Germany for its supplies of dyestuffs.

Since the outbreak of the war the German government has permitted the exportation to Holland of dyestuffs equivalent to 50 per cent of the 1913 consumption up to October, 1915, and of 75 per cent since that date. On Jan. 25 last, however, the German dyestuff exporters were ordered to price their goods in gulden, using the pre-war exchange value. This, of course, had the effect of considerably increasing the real price of the goods.

As a result of a conference of the leading Dutch consumers of dyestuffs; an attempt is being made to deal with the question through diplomatic channels, and steps are also being taken to organize a coal-tar color industry.

A company has been formed, which will be connected with the Naarden chemical-works, and will confine itself at first to the manufacture of aniline oil. It will be financed by the Nederlandsche Handelsmaatschappij, and is assured of the support of the large consumers of dyestuffs and of the producers of raw materials. Apart from difficulties due to inadequate supplies of raw materials and of coal or other sources of power, Holland lacks the requisite supply of trained chemists and experienced workmen.

Tests Indicate That Gas May Be Used Profitably for Case-Hardening of Steel

Advantages of Process Are: Decreased Cost, No Packing Required, Perfect Control Over the Addition of Carbon to the Metal and Its Uniform Distribution Over the Entire Surface

Experiments underway at Birmingham, England, indicate that the case-hardening of mild steel can be done by illuminating gas in a manner that shows an improvement over methods hitherto in use, and that the cost is decreased, no packing is necessary, perfect control is obtained in the addition of carbon to the metal and the distribution of the former over the metal surface is quite uniform. C. M. Walter, superintendent of the industrial heating laboratories of the Birmingham Gas Department, in a paper presented at the meeting of the Midland Junior Gas Association, held in Birmingham, June 24th, described the process as follows:

Steel to be Carbonized Suspended by Wires

The experimental furnace used in connection with the work consists of a circular iron retort, with its lower end sealed in an oil quenching tank, and heated by a furnace forming a jacket round its upper portion.

The work to be carbonized was suspended by means of wires in the body of the retort in such a manner that the carbonizing gas could have free access to the whole of the surface to be carbonized. Coal gas was passed into the retort at its lower end through a pipe situated about an inch above the level of the oil in the quenching tank, the waste gas from the retort being burned at its mouth.

Experiments were first carried out with town's gas at a pressure of about two inches water gauge, and with a retort temperature of from 1436 to 1472 deg. Fahr., and it was found that under these conditions very little carbon was absorbed by the steel.

The gas was then bubbled through a solution of ammonia and passed into the retort under similar conditions, with the result that a big carbon absorption took place, showing that the presence of a nitrogen compound was necessary to enable the dissociation of certain of the hydrocarbons to take place, and also to cause the carbon thus set free to combine with the steel.

Action of Ammonia Chiefly of a Catalytic Nature

Other experiments were carried out in a retort having a diameter of 2 in., and a length of 4 in., the volume of the coal gas used being approximately 15 cu. ft. per hour, and containing approximately 10 per cent by volume of ammonia gas. When working with a retort temperature of about 1620 deg. Fahr., the depths of case produced on work, consisting of a ½-in. square mild steel bar, amounted to 9/64ths in. in four hours' carbonizing, which is found to be much greater than that produced under similar conditions with a solid carbonizing medium. Further, the case was of a much closer grain than is usually obtained, with the result that the surface hardness produced on quenching was likewise greater.

In order to prevent decarbonization of the surface of the carbonized material by contact with air during the re-heating process, the work was sealed in coal gas and plunged directly into the quenching bath, sealing the mouth of the retort as soon as the correct hardening temperature has been reached. Thus, during the whole process, the work was free from oxidation and was cased uniformly over the whole surface.

No Cost Figures As Yet Available

No figures were yet available regarding the costs of case-hardening by this method on a large scale, but further experimental investigation was being conducted on practical lines, with a modified design of furnace in which the spent gases from the retort are utilized in heating up a regenerative setting, and from the results so far obtained there seems little doubt that the application of town's gas in this connection could be regarded as a commercial proposition.

Output of Utah Company Shows Big Increase

The gas output of the Utah Gas & Coke Company of Salt Lake City, for the week ending June 17, showed an increase of 400,000 cu. ft. over that for the corresponding week last year. The total output was 8,971,000 cu. ft. That for the week ending June 10 was 200,000 cu. ft. more than in the same week in 1914.

Believe That By Next Year Bulk of Artificial Dyes Consumed in Country Will Be of Domestic Production

When European War Broke Out 29,000 Tons Were Being Used in United States—3,300 Tons Were Produced Here and 25,700 Tons Were Imported—Present Domestic Production from American Coal Tar is 15,000 Tons

Well informed authorities believe, states the *Nation's Business*, issued by the U. S. Chamber of Commerce, that, by 1917, the bulk of artificial dyes consumed in this country may be made in American works, from American raw material, by American labor.

It has been stated that the total value of the output of the German coal-tar industry is about $75,000,000 and that the annual importations to this country are only about $6,000,000. British estimates at the beginning of the war indicated that they would have to provide for themselves about $10,000,000 worth of dyes and dyestuffs which they formerly bought from Germany, and, which, as is also the case in this country, represented the major part of what they consumed in their domestic industries.

Importance of Industry

It is in a way surprising that an industry which has attracted so much attention and had so far-reaching an effect in this country should be,—so far as we are concerned, and from a comparative point of view,—of such small proportions. Any branch of industry in this country whose total annual output does not exceed $6,000,000 is not generally regarded as a leading industry, but the dyestuff industry has so many ramifications that its importance cannot be measured by the cash value of output consumed.

Increase in American Dyes

When the war broke out we were making about 3,300 short tons of dyes in this country and importing 25,700 tons, 22,000 of which came from Germany. It may be said in passing that these dyes are artificial and produced by various synthetic color processes which Germany has mastered and, so far as the commercial world is concerned, had practically monopolized.

But it would seem as though this day had passed, for present estimates indicate that we are already making more than 15,000 tons of artificial colors from American coal tar. Well-informed authorities believe that by the year 1917 the bulk of artificial dyes consumed in this country may be made in American works, from American raw material, by American labor.

In other words, there are many who believe that the war, which brought out in sharp relief the fact that in a number of lines we are not industrially independent and self-sufficing, may, in regard to the dyestuff industry, have brought its own remedy.

A successful and permanent result will probably depend a good deal on whether Congress will provide protection, through tariff duties or other means equally or more effective, to enable this coming industry to attain full stature before it has to meet on equal terms the keen foreign competition which it is bound to encounter.

Switzerland Also an Important Producer

When the war began there were two countries which produced most of the chemical colors of the world; namely Germany and Switzerland, the proportions available for export in the two countries being in the relation of 9 to 1.

The close of the war will see not only England, but also the United States, equipped with dyestuff industries which may prove adequate for domestic demands. Just what will happen cannot be forecast, but it is certain that England will spare no effort to maintain an industry which has been established in that country at the cost of so much capital and energy.

It is also not unlikely that a strong demand will be made in the United States that the one great branch of color chemistry now wanting in the cycle of our national industries should be complete and self-sufficing on our own soil.

The movement for preparedness will further accentuate this demand, because of the fact that coal-tar products, among which are dyestuffs, are a vital element in modern high explosives.

There has, of course, been a movement to piece out the shortage by turning to natural or vegetable dyes, such as indigo and madder. Experiments have also been undertaken with yellow from osage orange.

The domestic output of synthetic dyes, prepared by artificial processes, is still far from supplying the total demand.

Here the existing equipment in several large American works has proved to be a valuable asset. The use of natural dyes such as logwood fustic, have been much facilitated. In nearly all branches of the textile manufacture it has now been found practicable to introduce it in use effectively.

It is, therefore, not surprising to find it estimated that the current output of dyewood extracts is to-day about three times what it was in 1914. Deniums and similar fabrics are now being dyed with logwood blue. A valuable adjunct to these natural dyes is the yellow which has been obtained from the osage orange of the Mississippi Valley.

Prospects for the Future

One thing is encouraging. The United States possesses all the raw material needed not only to supply its own demands for dyestuffs but also those of other countries as well. Without going too far into chauvinistic propaganda for industrial independence, there is no doubt much solid ground for the prospective success of a coming industry.

Education of Employees Brings Big Return in Economies and in Increased Output

C. F. Paige, of the Malden & Melrose Gas Light Company, of Malden, Mass., in Paper Prepared for the National Commercial Gas Association, Cites Instances and Urges Widespread Adoption of System in Gas Field

"What are *you* doing to prepare against a shortage of labor in *your* various departments?" asks C. F. Paige, of the Malden & Melrose Gas Light Company, of Malden, Mass., in a paper prepared for the National Commercial Gas Association. As a solution of the problem the education of employees is suggested. Due to the proper training of its employees, the Pennsylvania Railroad saved $30,000 on brake shoes alone. The National Cloak & Suit Company increased its total output to the extent of $40,000 in one year. The substance of Mr. Paige's discussion is practically as follows:

Trained Men Best Provision to Combat Competition

What are you doing to prepare against a shortage of labor in your various departments? Are you planning any means for combating the ever increasing forces of competition? Your hope lies in trained men.

In a magazine article entitled "The Dangers of False Business Economy," Herbert N. Casson says that "the main thing in a business crisis is not to slash expenses or hire cheap help. The main thing is *results*. The way to reduce expenses is to have better methods and a well trained staff."

From the manager's point of view, the training of employees is not the employer's duty to society, but his obligation to his own company. This fact comes home to gas men. In practically no other industry have efforts to train employees systematically been undertaken as spasmodically and half-heartedly as in the gas industry.

Organized industries the world over have found it a paying investment to train their employees in systematic courses of study. The Pennsylvania Railroad lines have operated apprentice schools for six years as a "decidedly profitable investment."

"The wise manager has an understudy ready for each position above a certain point." So saying, the Solvay Process Company expends from $50 to $200 to train each new man for his place in its works. Pittsburgh has established a Continuation School to promote vocational education.

ACTION OF U. S. CHAMBER OF COMMERCE MOST SIGNIFICANT OF ALL.

But most significant of all is the fact that the Chamber of Commerce of the United States, the big National association of the leading business and commercial organizations of the country, has registered itself by vote, to be overwhelmingly in favor of vocational schools of manufacture, commerce, agriculture and home economics.

Can the gas manager behind the alibi, "busy-ness," afford not to stimulate interest in educational work on the part of employees under him?

In the past he was not wholly to blame, because his opportunity to provide courses of instruction for his men was limited almost entirely to working operations. Now, however, he has available systematic courses in the theory and practice of a practical gas education.

Will the manager's effort or the company's money in establishing these courses among its employees really pay? The Pennsylvania Railroad lines have saved $30,000 on brake shoes alone, because of the proper education of its car inspectors. The National Cloak & Suit Company, by training 800 employees, increased its total output $40,000 in one year. In the New York University School of Commerce, a freshman taking night classes earns $65 to $70 per month. As a senior he is earning $100. The difference represents his increased value to his employer, largely because of his education.

COST OF LABOR TURNOVER ONE OF LARGEST EXPENSES INDUSTRY HAS TO BEAR

The cost of labor turnover in all except the most unskilled operations is one of the largest expenses that an industry has to bear. Labor turnover brings absolutely no returns.

Organizations that have established trade schools have cut the labor turnover to less than 50 per cent of its former figures. Investigations carried on at the New York University, also show this decided effect upon the turnover of labor by educational work.

Educational work cannot be carried on with merely the tacit approval of the manager. Left to themselves, only 10 per cent of the students who enroll in correspondence courses complete them. These men need the active approval of the executive behind them. The incentive which insures the sustained interest of the student has been found in an organized system of class instruction. Such classes may be conducted entirely on the employer's time or in part only. Some companies have classes during working hours—a method resulting in practically perfect attendance and amply paying for itself. One company holding evening classes pays the students for this extra time. The main thing is to show the men that the company is with them and behind them in this effort to train them.

EMPLOYER OF TO-DAY CANNOT AFFORD TO MAINTAIN ATTITUDE OF INDIFFERENCE TOWARD HIS EMPLOYEE

Are you an executive suffering from "inertia of conservatism?" Do you prefer to let well-enough alone? The effect of such a policy is bound to be felt at every point of pressure and competition. The employer to-day can no longer afford to maintain an attitude of indifference toward his employee.

He must realize that the best way to get the trained employees is to make them.

We do not expect the effort at instruction to show results over night, but we know that the interest of the executive in a course of instruction, alone will improve the morale of his force enough to make his effort worth while. Have you as an executive looked into this matter? Are you still questioning whether it is worth while?

Big Increase in Oil and Gas Company Incorporations

In the last five months of 1914 the incorporations of oil and gas companies amounted to $38,237,000, but for 1915, during the entire year, they were $80,533,000. The first five months of 1916 show a total capitalization of new oil and gas incorporations of $277,499,000.

Great Use Can Be Made of Bulletin Board in Safety Campaign

The bulletin board may be made of great use in the safety campaign in the factory, according to Bulletin No. 77 of the Department of Labor, New York. It may also, if overdone, chill interest in the subject. The contents of bulletin boards, when read, make a constant appeal for safety. When unread, they are monuments to a dead cause. The following suggestions are given as to making the safety bulletin board most effective:

Brevity: Few men stop to read a wordy bulletin. Even at lunch time a long, printed bulletin must be of unusual interest to hold the attention of the workers.

News: Bulletins are effective in inverse proportion to the length of time they are posted. After they have been up for two weeks they are of doubtful value.

Statistics: Detailed statistics have not been universally demonstrated to be effective in use on safety bulletin boards. Not all workmen understand them. However, their results can be so charted as to be intelligible to most workmen.

Pictures: Pictures are most generally "read"—photographs especially. A picture is often used effectively to call attention to a short printed or typewritten statement.

Letters: Short letters or typewritten communications signed by some one in authority in the factory attract attention better than do printed statements.

Cartoons: Occasional cartoons or the use of subject matter other than safety varies the monotony but also detracts from the value of the board as a safety reminder if too much extraneous matter is introduced.

Simple Language: Bulletins must be in the language understood by the workmen. If they read Croatian put simple Croatian on the bulletin boards. If they read no printed language, post pictures instead.

Location of Boards: Have a definite place for posting bulletins, so situated as to reach the greatest number of men. If more than one bulletin board is accessible to the same group of men, put different subject matter on them.

Discontinuance: If all known means of keeping up interest in bulletin boards fail, leave the boards bare for a while. A bulletin which is not read is worse than none at all. Later the system may be renewed. Moving the board to another part of the plant will renew the interest of the workmen.

Milwaukee Creates Bureau of Illumination Service

In order to carry on the construction, operation and maintenance of its new street lighting system, the City Council of Milwaukee has passed an ordinance creating a sub-department or bureau of the department of public works. The new bureau is to be known as the bureau of illumination service, and is to be organized in two divisions—the division of illuminating engineering and the division of construction and maintenance. The division of illuminating engineering is to have charge of the character, type, size, location, design and routing of all electrical and gas equip- construction and maintenance is to have charge of all construction, inspection, and maintenance and repair work of all lighting circuits, fixtures, posts, lamps, etc., owned and maintained by the city of Milwaukee.

The bureau of illumination service is placed under the immediate direction of the commissioner of public works, F. G. Simmons, who has appointed F. A. Vaughn, of Vaughn, Meyer & Sweet, Milwaukee, as consulting engineer for the installation. Mr. Vaughn is retained on a basis of $10,000 per year, and the term of employment is to be approximately six months.

The ordinance also creates the following positions in the bureau of illumination service, appointments to which are to be made by the commissioner of public works as soon as competent men can be found: Engineer in charge of the division of illuminating engineering at an annual salary of $2,100, and three assistant engineers at salaries of $960, $840 and $720 respectively; engineer in charge of the division of construction and maintenance at an annual salary of $2,400, and an electrician and electrical assistant in the same division at salaries of $1,200 and $900 respectively. The sum of $5,500 was appropriated from the 1916 budget for the payment of salaries during the current year for the positions created.

Birmingham Tests Indicate That Coal-Gas Pitch Can Be Carbonized Without Difficulty in Horizontal Retorts

Coke Produced Showed No Signs of Having Been Affected by Use of Pitch, Though There were Indications that Less Breeze and Dust were Made—In Continuous Verticals Results were Poor as Only Effect was to Distill off Volatile Matter Without Changing Its Composition.

In a series of tests undertaken by the Birmingham Corporation Gas Department at the request of the High Explosives Department of the British Ministry of Munitions, it was demonstrated that coal-gas pitch can be carbonized without difficulty in horizontal retorts, and that mechanical troubles during the process are avoidable. E. W. Smith, chief chemist of the Birmingham Corporation Gas Department, described the tests in a paper presented at the general meeting of the Midland Junior Gas Association, held June 24, at Birmingham, England, as follows:

No Mechanical Troubles Occurred

Throughout all the tests no mechanical troubles whatever occurred during the process of carbonization. The tar in the hydraulic main appeared to be more fluid when pitch was used than when coal alone was being carbonized. The same coal was used throughout the two series of tests. These were two well known coals, the results from which had been found to be very regular. Tests on each coal alone preceded each series. Weighed quantities of the pitch used were spread evenly over each truck of coal. The coal and pitch were put through the crushers, raised by means of a bucket elevator to an overhead hopper, and passed down a shoot to bogies, which conveyed the crushed mixture to the further overhead hopper commanding the De Brouwer charger on the horizontal plant. This procedure insured an intimate mixture of the pitch and coal.

34 Tons of Coal Per Day Carbonized

About 34 tons of coal per day were carbonized, and there was a preliminary run of at least twelve hours before the test commenced. Over 200 tons of coal were carbonized for each individual test. The retorts were not filled. There were 24 retorts charged every eight hours—the charge averaging 9.5 cwt. The retorts were semi-eliptical-shaped, 20 ft. long, and 24 in. by 18 in. cross section. Liquor seal was used in the hydraulic main, and the gas was passed through the retort house governor, air and water condensers, Livesey and Holmes brush washers and oxide purifiers.

Four kinds of pitch were used in the tests: Coal-gas pitch, two which were residual products from the distillation of heavy petroleum oil and had the appearance and fracture of coal-gas pitch, and Mond pitch obtained from the pitching plant at one of the corporation's gas works, where the tar made on the Mond producers is dehydrated and distilled, the light oils and the creosote being taken from the tar and the pitch remaining. This creosote contains about 50 per cent tar acids, as is to be expected from the method of gasification of the fuel. The essential differences between the four pitches is that the coal gas pitch is a product of high-temperature carbonization, and likely to be largely aromatic in its constituents, while the other three are largely paraffinoid and susceptible of further cracking at the normal temperatures of carbonization. This was borne out by the results.

Inclined Retorts Not Suitable

The chief utility in the carbonization of the materials (except coal-gas pitch) was in their value as enriching agents to take the place of benzol, cannel, or carburetted water gas. The tests for toluol and benzol in gas and tar were carried out according to the specifications of Dr. Colman.

The experiments indicated that coal-gas pitch can be carbonized without difficulty. It is not advised, however, that it be tried on any except horizontal retorts, and with hand-charging or a De Brouwer charger, when quantities up to 5 per cent are used. Crushed hard material up to 1 per cent may be used in horizontals with most other forms of charger. It is not a very suitable material for verticals, as the heat from the retorts will tend to soften the pitch while in the overhead hoppers, and prevent the travel of the coal therein. Inclines are again not suitable, as the coal will not flow down the retorts easily enough for smooth working.

Trouble Occurred with Petroleum Residual Pitch

During the tests some trouble occurred with one of the petroleum residual pitches as it was too soft to put through the crushers.

The coke produced showed no signs of having been affected by the use of pitch, though there were indications that less breeze and dust were made. Mond-gas pitch has been carbonized in two of the Birmingham works in horizontal retorts for some months, to the extent of about 60 tons per week, and the results have conformed with those obtained on the coal test works, as far as could be determined.

The 70-ton per day plant on the test works has run continuously from September to May, carbonizing pitch materials, and no troubles have been experienced. These materials showed equally satisfactory results in intermittent verticals and in horizontals, but the quantity used must not exceed 20 per cent, as the pitch might drip from the retort lids and cause inconvenience to the men. In continuous verticals the results were poor, as the only effect was to distil off the volatile matter without changing its composition. The cracking space was apparently too small for the increased oils evolved.

Gas Washer Recovers Potassium Passing Out as Fume at Buffalo Plant

Cyclone dust collectors and a gas washer are used to collect the potassium, passing out as a fume in combination with chlorine, at the plant of the Buffalo Potash & Cement Corporation at Buffalo, N. Y. In the process in use the raw materials consist of feldspar rock, calcium chloride, limestone and coke.

These are charged into a water-jacketed blast furnace of the standard copper-smelting type, having a 42 x 120-in. hearth. Two products are obtained: Potassium chloride, averaging over 80 per cent KCl, commonly known as muriate of potash, and a slag from which a hydraulic cement is made.

The feldspar rock used is a silicate of alumina and potash, averaging 12 per cent K_2O. The chlorine of the calcium chloride combines with the potassium at a temperature of 1100 to 1400 deg. C., and passes out at the top of the furnace as a fume, which is collected in cyclone dust collectors and a gas washer.

The limestone is added to flux the silica and alumina in the feldspar rock, and also the ash of the coke, forming a slag which is tapped from the furnace, granulated and manufactured into hydraulic cement. Over 90 per cent of the potash in the charge is recovered in the form of potassium chloride, and of that amount 80 per cent is collected in the dry collectors and 20 per cent in the washer.

Some Striking Figures in Regard to the Wastefulness of the Bee-Hive Oven

Five million tons of coal burnt in bee-hive ovens, without recovering any by-products represents a loss of 70,000 tons of ammonium sulphate, 250,000 tons of tar, and from 12,000,000 to 15,000,000 gal. of benzol, all of which could be saved if the coal was distilled in retort ovens.

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Make Your Worth Known

To advance in any profession or business one first must make his worth known. If his horizon is bounded by the individual plant, or the one small groove, the arquaintanceship of personal contact may be sufficient, but, if he looks to the higher places, it is necessary that he make use of other means of making his name and his value known to those to whose advantage it will be to aid him in his progress upward.

John Jones in the little independent plant in Nowhere may be a man of exceptional ability. He may effect big improvements in the equipment and reduce operation to a science. But, unless John Jones finds some method of making his accomplishments known outside of his own organization, it is highly likely that he will progress no farther than the highest office in his small, isolated independent company. The case of John Jones is perhaps an extreme one, but it illustrates a point and drives home a lesson.

Publicity is the life of progress. If the gas man is to attain one of the high places in the industry it is necessary that his name and his abilities be brought to the knowledge of those who have already attained the high places, or who have better positions to offer. Active participation in association or society affairs is one excellent method of accomplishing this. The contribution of signed articles or discussions to such a periodical as the AMERICAN GAS LIGHT JOURNAL is another.

If the previously mentioned John Jones should write an article describing each of the improvements he has effected and point out the lessons to be derived from his studies, the notice of the big men of the industry would soon be attracted. They would discover that John Jones was a man of rare ability, that he had the power of thinking and of originating. Such men are extremely rare in proportion to the demand. It is quite likely that, as a result, one of the big men would eventually seek John Jones out and induce him to depart from his obscure corner, and that, in the end, John Jones would attain a place in somewise proportionate to his worth. He might even, in time, become one of the big men himself.

Proper Backfill in Gas Main Trenches

In his article on subsurface congestion in New York City, which appears in this issue, C. N. Green, engineer of subsurface structures of the New York Public Service Commission, First District, makes the assertion that it is *impossible* to properly backfill street openings made by gas companies in laying new mains and installing services, or for repairs to either. This journal cannot agree with Mr. Green in such a statement. It believes, and experience has borne out the belief, that it *is* possible to backfill a trench and leave it, after a period of settlement, in such condition, that the restored pavement will have a reasonable assurance of a firm and durable subsurface foundation.

New York City has been rather unfortunate in the past in its experience with pavements restored over street openings, for reasons for which the highway departments of the various boroughs have been, almost invariably, responsible.

To insure a good job of backfilling this journal would respectfully suggest; first, that the trench should be refilled with good, clean earth up to a few inches above the bottom of the pipe. This filling should be thoroughly tamped and forced in under the pipe with railroad tamping bars as it is deposited. Then, it should be flushed down with water; the latter being brought into action gradually—not in floods—until thoroughly saturated, and in a semi-fluid state. Shovelers, meantime, should be kept on the bank to throw earth into each hole as it develops. When it is evident that the water has found all the voids and has carried in earth to fill them, one or two feet more of fill should be shoveled in and the flushing process repeated, and so on, up to within a few inches of the pavement surface.

In most streets of a city of the size of New York the pavements are mostly laid on a concrete foundation. This would have to be broken up to excavate the trench, and the fragments should be kept apart from the earth excavated so that this material will be available to fill up the remaining few inches. The surplus should be carted away to some convenient point to be stored.

After the fill has had sufficient time to dry out and to have the necessary stability, traffic should be permitted to pass over it. This and weathering will have the effect of causing other settlement. A maintenance cart should be charged with the responsibility of keeping the holes that appear filled up by adding the broken concrete from the storage pile at regular intervals.

By following this procedure permanent repaving could be delayed for several months without inconveniencing traffic to any appreciable degree, as the old concrete will form a hard surface, level with the pavement on both sides.

Such procedure, however, has been seldom followed in New York. The primary reason is that gas companies, and, in fact, various municipal departments as well, have been given no incentive to do it. In one borough, at least, the gas company has been absolved, by force of ordinance, from any real interest in the future condition of the pavement over its trenches. Its street-opening permits are granted conditional upon the payment of an arbitrary price per square yard—in one case, at least, almost three times a proper amount—and the highway department of the borough makes the restoration itself.

Another reason is the apparent reluctance of the city water department to permit the use of water for flushing, even when it is paid for.

Within recent memory is the case of a water main contractor who was laying a 48-in. line for the city. This man had a 6-ft. trench-width limit, and a necessary depth of at least 8½ ft. The pipe reached its greatest diameter 2½ ft. up from the bottom where there was left a space of less than a foot between it and the bank. The angle was such that it was physically impossible to get a tamping bar in to properly pack the earth under the center of the pipe. This contractor wanted to flush his backfill, and eventually did, but before he obtained the permission to use the necessary water he was almost disheartened as to whether he ever would.

A third reason is the great hurry the city officials seem to be in to get the pavement restored. No tamper better than the effects of weathering has ever been devised. There is no real reason why a trench refilled after the manner we have outlined could not be left unpaved for six months if necessary; and, if the gas companies were provided with an incentive to do it, it is certain they would.

Gas companies have the principle of public service so thoroughly inculcated within them by the very nature of their work that if they were given the opportunity of seeing their own openings through to the end, it is certain that the resulting pavement would be a more durable affair than has been the case in the past, and the total expense of the restorations to such gas companies would be very much less than it has been.

Franchises to Competing Gas Companies

Competition, it has often been said, is the life of trade. It is also the father of wasteful duplication. This point is strongly emphasized in Mr. C. N. Green's article on the congested subsurface conditions in the streets of New York City, which appears on page 49 of this issue. Those not familiar with the gas history of the city will be surprised at the apparent lack of discrimination that existed in the granting of gas franchises. Undoubtedly, the spirit behind the prodigality was the lowering of the rates of the existing companies.

New York City in its congested subsurface condition is now reaping the harvest. There is but one lesson to be learned—the admission of a competing company is a poor method, in the long run, of lowering rates. One well designed and balanced system undoubtedly can produce and distribute gas cheaper than can two, and a real lowering of rates is made possible only through increased economy in production and distribution.

Mr. Green states that there are many duplicating gas mains in New York City. Undoubtedly there are. But each one of those mains has a right to its place in the street, and represents a legitimate investment of capital.

Possibly, it would be as well, or better, that some of them be removed. But their removal would entail a large expense.

Would it be just, then, that the community that granted the franchise under which the mains were laid, should compel, if it legally could, the gas companies to go to great expense to destroy their own property? We think not. If such a work must be undertaken it should be undertaken at the city's expense, and the gas companies should be reimbursed for the space and privileges they were giving up.

The gas service supplied in New York City requires no commendation from this journal. In its efficiency it commends itself. Perhaps there are many duplications in its distribution systems, and, perhaps also, it is because of those duplications that consumers are so seldom inconvenienced due to lack of gas.

Intelligent Propaganda

Propaganda such as is being carried out by the Peoples Gas Light and Coke Company of Chicago in its series of folders explaining various details of its business which it desires the public to be acquainted with, cannot but have a beneficial effect, not only on the interests of that company alone, but on those of the entire gas industry as well.

The company, among other things, desires the right to manufacture its gas according to the heat-unit standard instead of a candle power standard. In one of its papers it explains why "heat-unit gas" is cheaper to make than candle-power gas, and explains why, in the light of present-day conditions, it is better, in so attractive a manner that the most casually interested are tempted to read, and in such clear and non-technical language that even laymen can easily understand.

No great claims of extensive reductions in rates are made. The company is frank in its statement that it cannot tell what the saving will be. This is an honest propaganda, and honestly brings results.

Why?

In the United States there are many towns sufficiently large to support gas plants in which there are none. If the average gas engineer were asked why such plants are a necessity and great convenience he would be able to cite offhand a dozen reasons. Why, then, are there so many towns which lack them?

Is it for financial reasons? We think not. Capitalists are only too eager to invest their money in safe propositions that promise a reasonable return.

Is it because there has been no studied effort to seek out such towns as would seem likely prospects, and arouse a sentiment among their inhabitants that would make the establishment of a gas plant a profitable investment? We have too much confidence in the intelligence and assiduity of our large operators and promoters to cherish such a thought for a moment.

Two reasons for the fact that so many of our towns are without gas works stand out beyond all others. Either the large operators are individually not large enough to thoroughly scour the country over more than a certain limited territory, and there is not sufficient unity among the different companies to insure that no territories will be left untouched, or the operators and promoters have failed to stimulate the sentiment for gas that could be aroused.

The first reason is self-apparent; the second presents a question of its own. Why have those to whose interest it is to arouse a sentiment for gas failed? Surely, it cannot be from lack of intelligent effort.

Statements made by those who have something to sell usually are taken with a grain of salt by the prospective buyer. It may be that they are perfectly honest and matter-of-fact, but the one whom it is desired to convince will not always accept them as such. The townsman from whom the promoter wants to obtain a franchise, and to whom he wants to sell gas will always have in the back of his head the knowledge that the promoter has something to gain by convincing him—something to sell.

To the mind of this journal the stimulating of sentiment for a gas plant could best be accomplished by a disinterested party—one who has nothing to gain by the deal. Such a party could search out its prospects, and, from an entirely unbiased standpoint, could indicate the numerous advantages to the town that would follow the building of a gas works and distribution system. Having nothing to sell, the statements made would have a greater chance of being accepted as sincere.

Assume that this disinterested party did work up a sentiment for gas in a particular town to the point that it was ready to grant a franchise on the best terms offered, and enough citizens would pledge themselves to install services to justify the project, then the disinterested one could call his work done and step aside. The capitalists and operators would then step in, and the one making the best proposition would get the work. The result would be one more gas plant, and a consequent benefit to the industry as a whole.

This is an important subject and is a pressing problem in the gas field. Its solution, for it has not been effectively solved as yet, is not the work of one mind but of many. The AMERICAN GAS LIGHT JOURNAL would like to have the views of its readers in regard to the problem, and to publish them in these pages. Much of the future business of the gas industry unquestionably lies in towns which have been likely prospects for years, yet which are undeveloped up to the present time.

Describes Methods of Popularizing Gas for House Heating Purposes in Baltimore

Thomson King Also Describes Appliances Used and Sets Down Important Points in Connection with Gas Heating—Many Coal Furnaces Being Converted

Baltimore now has a gas rate so low that it is entirely practical for its citizens to enjoy, at a moderate cost, the cleanliness, convenience and comfort obtained through heating their homes with gas. With the establishment of the schedule "D" rate for domestic consumers, the Industrial Fuel Department of the Consolidated Gas, Electric Light & Power Company began an extensive series of tests and investigations, in order to obtain reliable, complete and accurate information on every phase of house heating. Thomas King, superintendent of industrial fuel sales of the New-Business Department of the gas company, describes the methods used to popularize the service and discusses the general problems of gas heating in his city as follows:

Houses Rented for Experimental Purposes

Two houses were rented and used for experimental purposes and tests were conducted and data collected with a view to establishing the cost of heating various types of houses with different heating systems, and the merits, advantages and limitations of the systems commonly in use for house heating, so that the probable cost of heating any house could be estimated, and the most efficient and convenient system be recommended.

Various makes and designs of furnaces, radiators, burners and thermostats were tested and tried out in actual use, and those best adapted for our needs were selected and standardized for installation.

Applicability of Gas for House Heating Purposes

Gas can be supplied to any central heating system—hot water, steam, vapor or hot air. It can also be used in individual heaters or radiators, the gas being burned in the rooms to be heated. The radiators may be either of the vented or unvented type.

In the case of the house already provided with a central coal furnace, we have the choice of three methods of procedure—we may remove the coal furnace and set a gas furnace in its place; we may set a gas furnace besides the coal furnace and connect it to the system so that either may be operated, or we may convert the coal furnace to the use of gas by installing suitable burners in it.

The first two methods are considerably more expensive in first cost, but they are also more efficient and satisfactory in operation.

We are now installing splendidly designed gas furnaces of very high efficiency. We are also converting many coal furnaces, and, since these furnaces were built and designed to burn coal, with requirements quite different from gas, and, since they vary widely in make and design, and some contain hot-water coils and some do not, nearly every one presents its peculiar and individual problem. Efficiency can only be obtained by careful selection of burners and adjustments of air and draft conditions.

Use of Gas-Steam Radiators

For the older houses in the city, now heated with Latrobe stoves or any heater other than a central furnace plant, the gas-fired radiators will prove convenient and economical in the use of gas. These radiators may be of gas-steam or hot-air variety. In either case their appearance is very similar to the familiar steam radiator.

The gas-steam radiator is provided with a gas burner and the bottom of the radiator is covered with an inch or two of water. When the burner is lighted, the water is turned into steam, giving us a miniature independent steam-heating system. It is provided with a device which turns down the gas as the steam pressure increases, and also with a safety valve. They are practically 100 per cent efficient, as all the heat of the gas is discharged into the room, because there is no vent.

The gas-fired hot-air radiator is much the same in appearance as the gas-steam variety; no water or steam is contained in its sections. It may be either vented or unvented.

For the heating of bedrooms, it is advisable to provide a vent for the radiator, in order that the products of combustion may be carried out of the room.

These individual gas-fired radiators may be especially useful even where a coal furnace is used. Almost every house contains one or more rooms that are very hard to heat. It is almost impossible to keep them as warm as the rest of the house with the furnace. A small gas-fired radiator is always ready, and will entirely overcome this trouble.

Conveniences of Gas Heating

One of the most delightful features of house heating with gas, is the ease with which it can be regulated and controlled by thermostats. When gas is installed in a furnace, a thermostat should be installed in the living room or some other central part of the house. The pointer of this thermostat can be set at 70 degrees, or any other temperature that the owner desires.

The thermostat will keep the gas burning until this temperature is reached, and then turn it off. When the temperature begins to drop, the gas will be lit again and the temperature of the house can be kept at the same point as long as desired without the slightest effort on the part of the occupants.

Cost of Gas Heating

When a gas-designed furnace is installed we would expect the cost of the gas at 35 cents to be about 25 per cent over that of coal at $8 per ton. Where a converted furnace is used, it may run as high as 50 per cent more than coal at the same price, but against this additional cost we have the tremendous advantage and comforts of gas heating.

Who can say how much it is worth to be rid of the dirt and dust which invariably accompany coal and ashes and which filter through the whole house, in spite of the best efforts of the housewife?

Who can evaluate the sense of freedom which gas heating and a thermostat bring to the householder? No running up and down cellar steps to change the drafts; no fear of the fire going out if you are away all day; no need of anyone to come in each morning to look after it.

All these items and many more are quickly felt by anyone who heats a home, and during the coming season hundreds of Baltimore citizens are going to sign a "Declaration of Independence" from the drudgery of the coal furnace by depending on quick, clean and comfortable gas heating.

New Gas Association Formed in Texas

For the purpose of better furthering the growth of the gas industry in that part of the country, and to promote a better understanding between owners and employees, the Texas Gas Association was formally organized at Westbrook, July 9. The following officers were elected: President, M. T. Walker, manager of the Beaumont Gas Company; first vice-president F. J. Storm, manager of the Amarillo Gas Company; second vice-president, W. H. Clifford, general manager of the Palestine Light, Heat & Power Company; third vice-president, H. C. Morris, manager of the Dallas Gas Company; secretary and treasurer, C. H. Seidenglanz, manager of the Ruud-Humphrey Water Heater Company, of Dallas; directors, F. D. Murphy, general manager of the Houston Gas & Fuel Company; F. K. Whitehead, of Texarkana; C. A. Schwarm, general manager of the Corpus Christie Gas Company; K. L. Simons, manager of the El Paso Gas Company; C. B. McKinney, of Denison; A. T. Knies, manager of the Austin Gas Light Company; W. H. Sedberry, of Marshall; W. B. Tuttle, vice-president of the San Antonio Gas & Electric Company; and Fred. M. Lege, Jr., general manager of the Galveston Gas Company.

The first regular meeting of the new organization will be held at Fort Worth in October.

Wisconsin-Minnesota Light Company Shows Increased Gas Output

The Wisconsin-Minnesota Light & Power Company of Eau Claire, Wis., reports a total send-out of 1,028,400 cu. ft. of gas for the week ending June 24, a gain of 120,921 cu. ft. over that sent out during the corresponding week last year.

Utility Cost Forms Small Part of Living Expenses of Average Family

Those Endowed with Legislative Power to Regulate Rates Should Proceed Slowly Lest Great and Permanent Harm be Done

Courts, commissions, city councils and others interested in the regulation of rates of public utilities frequently become submerged in a mass of figures and become unduly impressed because of the large sums involved, states Harold Almert, in an article in *Public Service*.

An alderman may see from a statement published by a utility in his city that its net earnings over operating expenses and taxes for the year was a million dollars.

His first impression is that this is all profit and on account of the large amount, it must be excessive. He has no investment figure to apply these earnings to, and he has no knowledge of how much has to be deducted from these earnings to make good for depreciation before the correct amount available for interest and dividends can be determined.

Very few judges, public utility commissioners or councilmen have any idea of how the yearly income of the average family is spent, and what part of the total is expended for the various classes of public utility service.

In discussing this matter recently with a business man who was quite active in an effort to secure lower rates in his city, we sat down and figured out how much his family spent annually for all classes of local utility service. He could hardly believe the result, because he found that if by some means he could get all his water, electric light, gas and telephone service free, he would save less than one per cent of his yearly income. He lost all interest in the subject after the analysis.

Examples Cited

With families of very moderate incomes the saving expressed in percentage terms would, of course, be greater.

Carefully prepared statistics probably would show that less than 5 per cent of the total yearly income of the average family is spent for all of these necessities and conveniences.

To illustrate; take the case of a number of families in a small city in one of the North Central states with an annual income of only from $1,000 to $2,000 per year. In these cases the percentage is relatively high and assume that we are interested in the reduction of the gas and electric rates.

The results are as follows:

Total income		100%
Expenditure for electric service	1.13%	
Expenditure for gas service	1.28%	
Total gas and electric expense		2.41%
Balance		97.59%

In this case the City Council was endeavoring to reduce the gas and electric rates to a point that would absolutely ruin the utility company. If, instead, the council and citizens had used the same amount of effort and influence in reducing some of the other costs of living which, instead of decreasing like most the public utility rates have for the last ten years or more, have been steadily increasing, the following would result:

A reduction of only 3.3 per cent in the expenditure for higher living, etc., or 4½ per cent in the expenditure for food or 7 per cent in the expenditure for rent would offset the entire cost of electricity.

A reduction of only 7 per cent in the expenditure for higher living, etc., or 9.7 per cent in the expenditure for food or 15 per cent in the expenditure for rent would equal the entire expenditure for both gas and electric service.

With larger family incomes the effect would be materially less.

Utilities Biggest Investments

In most cities the public utility companies have a much greater investment per capita than any other business and, unlike many others, the physical property cannot be moved in the event of suspension of business without almost a total loss. In a growing community, the utilities have to have new capital continuously.

Assuming there is efficient management, the fairness of the rates determines the credit of the company. When rates are allowed that are high enough to earn all operating expenses, taxes, depreciation and a fair return on investment, new capital can be obtained on the most favorable basis.

If, on the other hand, the rates are fixed too low, if new capital can be obtained at all, it will be with large discounts and a much higher rate of interest. These increased fixed charges, together with insufficient earnings to make good depreciation, eventually finds the property so run down that the proper standard of service cannot be maintained.

By that time the public has become accustomed to low rates and refuses to pay more, the credit of the company has gone, the equity of the stock holders is gone and most of the equity of the bond holders is also gone.

When good and adequate service means so much to the comfort and convenience of people living in cities and towns, is it wise to legislate and force rates down to the doubtful point when such a small portion of the yearly income of the public will be saved?

The principles of public utility regulation have not yet been evolved and until they are well established and thoroughly understood those endowed with the legislative power to regulate rates should go slow lest great and permanent harm be done.

New Gas Ordinance at Kalamazoo, Mich., Becomes Effective August 1

City Will Inspect Each Meter Before it is Installed—Company Required to Make Free Extension of Mains to a Length of 100 Ft. Per New Customer On Order of Council

The new gas ordinance, passed by the City Council of Kalamazoo, Mich., July 10, will become effective, Aug. 1. It provides, among other features, that the company will be obliged to extend its mains for a distance of 100 ft. per each new customer, without charge, on the order of the City Council, and that all meters will be inspected by the city previous to installation. Upon application to the city clerk, any consumer may have his meter tested by the city engineer, and provision is made for reimbursement to the consumer if it is found to be running fast.

Radical Changes in Methods Made Necessary

Radical changes in the methods of main extensions, meter inspections, and meter reading, have been made necessary by the ordinance. The gas company will be required to extend mains free of charge at the rate of 100 ft. per new customer, providing it has been ordered to do so by the City Council. In order to obtain the free main extension prospective customers must contract to use the service for at least a year and make petition to the City Council.

City To Inspect Meters

The city will inspect every meter before it is installed by the gas company. Upon application to the city clerk, any consumer may have his gas meter tested by the city engineer, providing a deposit of one dollar is made. If the meter is found to be registering fast, a proportionate rebate will be allowed on the gas bills for the preceding six months.

The ordinance also requires that a duplicate slip of the monthly reading of gas meters be left in the homes or places of business when the meter is read. This will give all consumers an opportunity to check up on their monthly gas bills. All meter readers will also be required to display credentials upon request before they will be allowed to enter any house or building.

Heat Value Requirement Reduced

Before the ordinance was adopted, members of the ordinance committee met with the mayor to consider a number of suggestions made by E. W. Bemis. Upon his recommendation and that of the U. S. Bureau of Standards the maximum daily heat value average was reduced from 575 B. T. S.'s to 550 B. T. U.'s. The general penalties of the ordinance were also reduced as it was pointed out that the amounts could be more easily collected if not exorbitant.

Items of Interest from Various Localities.

Gas Company Should Not Be Required to Pay Salaries of Inspectors Who Do Not Inspect

Brooklyn Justice Rules that Inspection Charge is Legitimate One if Services Have Actually Been Performed—Grants Injunction Restraining Woodhaven Company from Laying Mains

With some caustic criticism concerning corporation inspectors who are employed by city bureaus and departments, but who do not inspect, Justice Cropsey in the New York Supreme Court, granted the motion for an injunction made by the city against the Woodhaven Gas Light Company of Woodhaven, Long Island.

The injunction restrains the company from tearing up streets and laying its gas mains until it has obtained the necessary permit from Deputy Commissioner Thomas Dwyer, who has charge of Queens Borough for the Department of Water Supply, Gas and Electricity. Some of the company's work along Jamaica Avenue was done without such a permit, and, in opposing the motion for the injunction, lawyer Jackson A. Dykman told Justice Cropsey that the company had obtained a permit from Borough President Maurice E. Connolly and that it should not be subjected to a double inspection system.

Difference of Views of Borough Officials

A difference in views between the Queens Borough President and the Deputy Commissioner as to whose subordinates should inspect such work was brought out in the statement by Lawyer Dykman that the Deputy Water Commissioner had sent bills to the Woodhaven Gas Light Company for inspectors who rarely, if ever, appeared on the work. Justice Cropsey in his decision said the duties of the Borough President and the Deputy Water Commissioner are clear and separate and that neither can restrict or circumscribe the other. The Borough President has the power to open the streets, and the Commissioner to regulate and control the laying of gas mains.

"Either permission without the other serves no purpose," said Justice Cropsey, in deciding that both the Borough President and the Commissioner have jurisdiction, "nor can either the Borough President or the Commissioner prescribe the conditions upon which the other may grant his permission.

Cost of Inspection a Legitimate Charge

"The Commissioner, having the power to regulate the laying of gas mains, can properly impose inspection. This does not mean, however, that the gas company must pay for inspectors who do not inspect. The papers presented on this application reveal a serious question.

The gas company presents affidavits showing that the Commissioner's inspectors have not worked, or have worked but little, although the company has been charged by the Commissioner for the full pay of these inspectors.

If the inspectors did not inspect, of course the gas company should not be required to pay, and the city would not be getting the protection it is entitled to have which comes from a proper inspection."

Duplicating Inspectors

Concerning a "supervising inspector," whose affidavit was attached to the papers Justice Cropsey said: "As his entire pay has been charged to the gas company, he must have been supervising only the inspector engaged upon defendant's work, the one inspector who seems to have been charged with that duty.

"It seems there was one inspector to inspect the work and this additional inspector to inspect him. The situation is one which seems to call for some action on the part of those interested. It is to be hoped that the daily reports of these inspectors are of more value to the head of their department than they seem to be on their face."

B. T. U. Gas Standard Adopted in St. Louis

Mayor Kiel of St. Louis signed an agreement with officials of the Laclede Gas Light Company, July 11, which permits tests of gas in St. Louis to be measured in heat units instead of in light units.

In return for the change in tests the gas company agreed to reduce the price of gas 5 cents per 1,000 cu. ft. The reduction will amount to about $240,000 a year to consumers.

Gas and Electric Lighting to be Brought Into Direct Competition at Salt Lake City

The Welsbach Street Lighting Company and the Utah Gas & Coke Company will be given an opportunity to bid on street lighting at Salt Lake City in competition with the Utah Power & Light Company. This was decided upon by the City Commission, in executive session July 11.

If it can be shown that gas is as good, or better, and can be furnished as cheaply or cheaper, for street lighting, the city may decide to light a part of the streets with gas when the present contract with the Utah Power & Light Company for electric light expires.

Queens County, New York, Gas Companies Win Suspension of Rate Reduction Order

A substantial victory was won by the gas companies operating in Queens County, New York, July 12, when Justice Hendrick, of the Supreme Court, granted to the Newtown Gas Company, the Woodhaven Gas Light Company, the Jamaica Gas Light Company and the Richmond Hill and Queens County Gas Light Company writs of certiorari and orders staying and suspending the orders of the Public Service Commission, which reduced the price of gas in the Second Ward to 85 cents and in the Fourth to 95 cents. The order of the Public Service Commission in relation to these four companies was to go into effect on July 1.

The effect of the verdict will be that the same rate will be enforced in Queens as heretofore.

The companies believe the orders issued by the commission will be ultimately revoked by the Supreme Court and that the $1 rate will be reinstated.

Gas Rates Reduced at Attleboro, Mass.

Word has been received in Attleboro, Mass., that the Taunton Gas Light Company will reduce its rates in that city to 90 cents per thousand cu. ft. The reduction was voluntary on the part of the company.

Public Service Commission Cannot Compel City Authorities to Issue Street Opening Permits

The Mayor and the City Engineer have absolute control over the streets of Baltimore, and the Public Service Commission has no authority to coerce them into granting permits to tear up paving for the installation of gas mains, according to an opinion handed down recently by W. Cabell Bruce, general counsel of the commission.

The opinion was rendered by Mr. Bruce, following a protest filed by the Consolidated Gas Company which stated that the city officials refused a permit for that company to install a service pipe at 23 South Front Street.

"Neither by express terms nor by necessary implication," says Mr. Bruce in his opinion, "does the Public Service law give this commission authority to interfere with the city in the exercise

of its plenary authority over its own streets granted to it by the General Assembly."

Then he quotes the city ordinances governing the paving and repaving of streets and says:

"The statute prescribes that when the pavement or repavement shall be once laid it shall not in any event be dug up or torn up in whole or in part at the instance of or by any person unless in the case of some special emergency that could not under the circumstances be reasonably expected to have been foreseen by such person except upon a permit obtained from the Mayor and the City Engineer jointly."

Mr. Bruce concludes that these officials have absolute discretion to issue or withhold such a permit.

Orders Abandonment of Gas Plant

In a decree issued by Judge T. D. Lewis of the District Court in Salt Lake City, July 6th, the Utah Gas & Coke Company is ordered to abandon its plant on West First South Street in that city by Dec. 31. The decree was handed down in a suit brought by property owners in the vicinity, who alleged that the fumes from the gas plant were injurious to adjacent property.

The company will appeal the order and asks six months to perfect the proceedings. This will hold in abeyance the district court's injunction.

Gas Company Interests Itself in Fly Extermination

The Grand Rapids Gas Light Company of Grand Rapids, Mich., has purchased several thousand good serviceable fly swatters which, as long as they last, will be given to the public free. The distribution will be made at the gas company's office, and one only will be given to a person. It is figured that there are enough to furnish one to every family in the city.

The swatters are a donation, on the part of the company, to the cause of the public health.

Readiness to Serve Charge Put in Force

A readiness-to-serve charge of 50 cents per month has been placed in force by the Northern New York Utilities, Inc., to cover depreciation of service pipe, meter, cost of maintenance, office expense, etc. It applies to all of the company's customers.

350 San Diego Gas and Electric Company Employes in Preparedness Parade

H. H. Jones, general manager of the San Diego (Cal.) Consolidated Gas & Electric Company, was marshal of the marching division of San Diego's Preparedness Parade which was staged, July 4.

Fifteen thousand people participated in the demonstration, one of the features of which was a section formed by gas and electric and allied industries. The San Diego Company's 350 employees marched in this section headed by a 20-piece band and are reported as having made the best showing of any organization in the parade.

Pintsch Company Enlarges Ogden Plant to Provide for By-Products for Manufacture of Dyestuffs

In preparation to enlarge and increase the efficiency of its Ogden, Utah, plant, the Pintsch Gas Company has awarded a contract to the Western Foundry & Machine Company of this city for four large tanks by which the by-products will be made available for manufacturing dyestuffs and high explosives. Machinery has already been ordered from eastern manufacturers for use in the work.

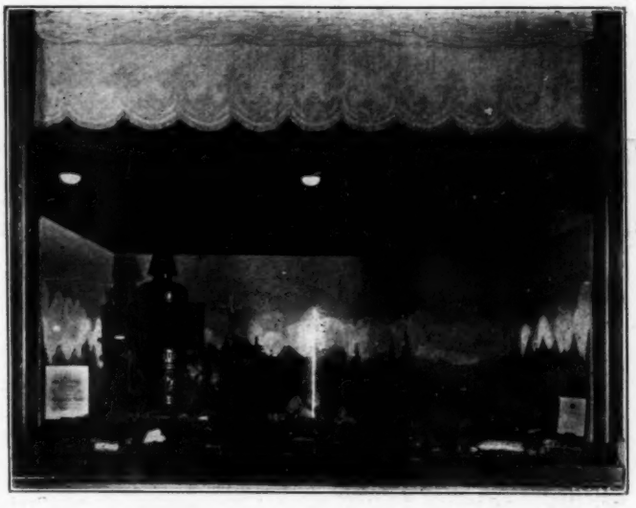
U. G. I. Prize Winner in Window Contest

During the convention of the Associated Advertising Clubs of the World, in Philadelphia, June 25 to 30, the Quoin Club, National Periodical Association, offered fifteen valuable prizes for the best window displays of nationally advertised products.

Three hundred of the leading merchants in Philadelphia entered the contest and the displays were marvels of ingenuity and careful working up of detail.

When the fifteen prize winners were announced it was found that the United Gas Improvement Company stood third on the list, the prize being an artistic silver loving cup suitably engraved.

The window which won the prize contained a display based upon the Ruud Automatic Gas Water Heater and was arranged to represent Old Faithful Geyser in Yellowstone Park. A photograph of the actual Geyser and its surroundings was used by the



OLD FAITHFUL GEYSER REPRODUCED IN GAS COMPANY WINDOW DISPLAY

decorator and scenic artists in arranging the foreground and the painted back ground, which was a panorama of the actual scenery.

A Ruud Automatic Water Heater was placed in one corner of the window. The water from the city mains entered the heater and after passing through the copper coil above the gas burner, continued underneath the false floor to a point at the center of the display where it spouted into the air in the form of a geyser.

The steam constantly coming from the water was eloquent evidence of the fact that the automatic water heater furnished a constant supply of hot water. The card in the window bore the following legend:

LIKE OLD FAITHFUL GEYSER IN YELLOWSTONE PARK THE AUTOMATIC GAS WATER HEATER GIVES AN UNLIMITED HOT WATER SERVICE

War Conditions Impress Advantages of Gas For Domestic Fuel Upon English Consumers

One result of the war on the gas business in England has been its effect on impressing the English people with the advantages of gas for domestic fuel. Coal has often been difficult to obtain, and various unusual methods of transportation have been resorted to in getting it to individual households.

Another difficulty has been in the matter of servants. So many women have been drawn from domestic service for work in munition factories by the higher wages offered that a large number of the well-to-do class have been compelled to do their own cooking. These difficulties have combined to attract greater attention to the advantages of the gas range over the coal burning stove.

Seamless Coating Used to Prolong Life of Firebrick Subjected to Intense Heat

The proper protection of linings in water gas sets, retorts, boiler furnaces and arches, and other places around gas works where linings are subjected to an intense heat, is a problem which has perplexed many engineers and plant superintendents and has been the cause of considerable experimental work. Frequent shut-downs for repairs not only are expensive from the maintenance standpoint, but the time lost while the apparatus is out of commission constitutes an important element.

The problem, it is claimed, has been solved in some cases by a preparation known as FEURIT, a powder, which, when applied according to directions, becomes a seamless protective coating, which, it is said, will not melt, crack or peel when subjected to intense heat, sudden and repeated changes of temperature or acid fumes. Not only is it applied as a coating in such work, but it is being used by a number of gas companies as a binder and for patching linings.

It is stated that the total expense of coating firebrick with FEURIT is not over 1½ cents per square foot, figuring labor as high as $4.00 per day.

H. H. Jarrett & Company, 120 Liberty Street, New York City, are sole agents for the material.

Personal Notes

H. M. KOHN has been appointed commercial manager of the Birmingham (Ala.) Railway, Light & Power Company. Mr. Kohn has conducted sales campaigns in a number of properties for the United Gas & Electric Engineering Corporation, which operates the Birmingham company.

THOMAS CRAWFORD, general manager of the Clinton (Iowa) Gas & Electric Company, has been elected president of the Clinton Commercial Club for 1916.

NICHOLAS F. BRADY has been re-elected president of the Municipal Gas Company of Albany, N. Y.

W. M. EMBRIE has resigned as manager of the Chattanooga Gas & Coal Products Company of Chattanooga, Tenn.

C. S. EMMERT, general manager of the Leavenworth (Kans.) Light, Heat & Power Company, has recently been elected President of the Chamber of Commerce of that city.

JOHN CORSCOT has been elected president of the Madison Gas & Electric Company, Madison, Wis.

H. O. CLARK has been appointed commercial manager of the Houston (Tex.) Lighting Company.

S. E. DE FRESE has been appointed manager of the Chattanooga Gas & Coal Products Company of Chattanooga, Tenn.

EUGENE V. GRIFFES has resigned as secretary and general manager of the Oceanside Electric & Gas Company of Oceanside, Cal. He will in the future be located at Pasadena and Point Firmen, Cal.

G. W. RHODES has been appointed assistant superintendent of the Henrico County Gas Company of Richmond, Va.

HUGH J. MITCHELL recently severed his connection as district manager with the Western United Gas & Electric Company of Joliet, Ill.

F. P. FLEMING has left the Arlington (Mass.) Gas Light Company to enter the Boston office of the Gas and Electric Improvement Company.

CLEMENT C. SMITH, of Milwaukee, Wis., president of the Sheboygan Gas Light Company, has been elected vice-president of the Baltimore Dry Docks & Shipbuilding Company of Baltimore, Md.

J. WEAVER SMITH recently became illumination specialist for the Nashville Gas & Heating Company of Nashville, Tenn.

A. I. SNYDER, formerly superintendent of the Grand Rapids Gas Light Company, of Grand Rapids, Mich., is now distribution superintendent of the Detroit City Gas Company, Detroit, Mich.

E. G. SYKES was chosen vice-president of the Portland Gas & Coke Company, at the recent annual meeting of the company.

GUY W. TALBOT has been elected president of the Portland Gas & Coke Company of Portland, Ore.

ALFRED TREADWAY has accepted the post of assistant engineer of the Detroit City Gas Company, Detroit, Mich.

HARVEY E. WEEKS recently became district manager of the Western United Gas & Electric Company, of Joliet, Ill.

L. B. RHODES, JR., has been made assistant superintendent in charge of works, of the Henrico County Gas Company, of Richmond, Va.

JAMES A. GREEN, vice-president and general manager of the Northern Idaho & Montana Power Company, and Attilla Norman, vice-president and general manager of the Oregon Power Company, have resigned from their respective offices.

ROBERT MONTGOMERY, manager of the Commercial Department of the Louisville Gas & Electric Company, of Louisville, Ky., has been appointed one of the division sales managers in the effort to secure subscriptions to Louisville's million dollar factory fund.

W. P. GUINAN, new-business manager of the Danbury & Bethel (Conn.) Gas & Electric Light Company, has been elected chairman of the mercantile bureau of the Danbury Chamber of Commerce. Mr. Guinan is also vice-president and a director of the latter organization, as well as a member of the publicity committee.

J. A. PERKINS, formerly manager of the Union Gas & Electric Company of Bloomington, Ill., has become general manager of the Lockport (N. Y.) Light, Heat & Power Company, succeeding Edgar Wallower, who has gone to Oklahoma City, Okla., to engage in the oil and gas industry.

THERON LONG, formerly of the Niles (Mich.) Gas Company, has become connected with the People's Gas Light & Coke Company of Chicago.

HERMAN GAMPER, formerly superintendent of the municipal gas plant of Columbus, Ohio, has been mentioned for appointment as expert to appraise the properties of the local gas companies for the city.

A. B. MCKIBBEN has been appointed manager of the Poudre Valley Gas Company of Fort Collins, Col.

B. E. JACK, formerly new-business manager of the Salina (Kan.) Light, Power & Gas Company, has been appointed to a similar position with the United Water, Gas & Electric Company, of Hutchinson, Kan.

C. L. DUNN, formerly of the Durham (N. C.) Traction Company, has been appointed new-business manager of the Salina (Kan.) Light, Power & Gas Company, succeeding B. E. Jack whose appointment to another position is noted elsewhere in this issue.

J. V. MURDAUGH, formerly new-business manager of the United Gas & Electric Company, of Bloomington, Ill., has been appointed commercial manager of the Colorado Springs Light, Heat & Power Company of Colorado Springs, Col.

J. C. NICHOLS, of Elmira, N. Y., has been appointed new-business manager of the United Gas & Electric Company, of Bloomington Ill., succeeding J. V. Murdaugh, whose appointment to another post is noted elsewhere in this issue.

Societies and Associations

THE BOARD OF EDUCATIONAL CONTROL OF THE NATIONAL COMMERCIAL GAS ASSOCIATION, at a meeting held at Association Headquarters, June 28, launched a campaign to secure 1,000 new students to begin the study of the educational courses in September. A special sub-committee will undertake to interview company members for the purpose of placing before them the advantages of systematic instruction of employees and the benefits of class organization. A collection of letters from prominent managers to the association, commending the Practical Gas Educational Courses, is being put into shape for distribution. The purpose of the campaign is to arouse executives of gas companies to the realization of the value of the material for vocational education which is available.

THE CANADIAN GAS ASSOCIATION, through George W. Allen, its secretary and treasurer, points out the advisability of those intending to attend the convention at Quebec making their hotel reservations early. August is Quebec's biggest holiday month, and accommodations will be hard to obtain if not made at once. The principal hotels and the rates they charge are as follows:

Chateau Frontenac	$5.00 to	$10.00	per day, American Plan
St. Louis Hotel	2.50 to	4.00	per day, American Plan
Clarendon Hotel	2.50 to	4.00	per day, American Plan
Victoria Hotel		2.50	per day, American Plan
St. Rochs Hotel	2.50 to	4.00	per day, American Plan

Construction Notes

POMONA, CAL.—The Southern Counties Gas Company is completing arrangements to take over the local gas plant. The plant will be completely remodelled and all old equipment replaced with new.

STOCKTON, CAL.—Plant improvements costing $10,759 are to be made by the Western States Gas & Electric Company.

WASHINGTON, D. C.—The Washington Gas Light Company is erecting a new pump and purifying house.

DAYTONA, FLA.—The Daytona Public Service Company is contemplating the laying of new mains during the summer. It may also install new gas-making apparatus.

PLANT CITY, FLA.—Roscoe Nettles of Tampa has asked for franchises for an electric light and gas plant at Plant City.

WAYCROSS, GA.—Contract for a $200,000 gas plant for the Consumers' Gas & Coke Company has been awarded to the American Gas Construction Company. Work, which will include a 16 mile distribution system, is now under way.

HILO, HAWAII.—It is reported that the Hilo Gas Company is contemplating the erection of a new gas plant. E. J. Smith is in charge.

ALTON, ILL.—Alton Gas & Electric Company has awarded a contract to the Parker-Russell Company of St. Louis for a new generator, which will be installed at the Alton gas plant.

MURPHYSBORO, ILL.—The Southern Illinois Utility Company has been formed for the purpose of taking over the local water works, electric light and gas plant, according to reports. The plants will be thoroughly overhauled and placed in excellent condition. An appropriation of $100,000 is said to have been set aside for the purpose. H. L. Farrer, of Aurora, Illinois, is the manager of the concern.

ELKHART, IND.—The Elkhart Gas & Fuel Company has planned improvements amounting to $15,000, to be completed this summer. The work includes the extension of mains for a distance of five miles.

ATTLEBORO, MASS.—It is reported that the Taunton Gas Light Company will begin work within three weeks on the construction of mains from Taunton to Attleboro. The line will go through Barrowsville and Chartley.

EAST LONG MEADOW, MASS.—Work has been started on the extension of gas mains to East Long Meadow. The Springfield Gas Light Company plans using trenching machine on the work.

FOXBORO, MASS.—The Taunton Gas Light Company, of Taunton, Mass., is said to be considering an extension of its mains into Foxboro.

ESCANABA, MICH.—The Board of Public Works has awarded a contract for the construction of a new 100,000 cu. ft. gas holder.

LANSING, MICH.—The Lansing Fuel & Gas Company is said to be contemplating extensive improvements to its gas plant.

MT. PLEASANT, MICH.—The Mt. Pleasant Light & Fuel Company has changed its corporate name to the Central Gas Company. It is reported that the company will extend its service to Isabella, Clare and Midland Counties.

LITTLE FALLS, MINN.—The Little Falls-Darling Gas Company has awarded a contract for a new gas plant to the Columbus Construction Company.

CRANFORD, N. J.—The Cranford Gas Light Company is to lay 1,700 ft. of new mains.

NEWARK, N. J.—A 2-lift 100,000 cu. ft. holder is being constructed by the Stacey Manufacturing Company for the Picher Lead Company.

ELMIRA, N. Y.—The Elmira Water Light & Railroad Company is contemplating extensions to West Elmira.

WILMINGTON, N. C.—The Tidewater Power Company is laying a gas line from Wilmington to Wrightsville Beach.

MASSILLON, OHIO.—Erection of gas producers at the Central Steel Company's plant on Columbia Heights, made necessary by the recent announcement of the East Ohio Gas Company that it would shut off the gas from mills and factories throughout the state Nov. 1, is said to be progressing rapidly. Efforts will be made to finish the work before November.

HAMILTON, ONT.—The United Gas & Fuel Company is considering the installation of a large by-product oven plant at Hamilton.

EVENSBURG, PA.—The People's Natural Gas Company of Pittsburgh has been asked to extend its gas service to this city.

SUMMIT HILL, PA.—The Girardville Gas Company has begun laying gas mains to supply this city and Lansford.

WEST CHESTER, PA.—The Chester County Gas Company contemplates making minor extensions.

GREENVILLE, S. C.—The Southern Public Utilities Company of Greenville, N. C., has let a contract for a gas plant to be constructed in this city to the Gallivan Construction Company of Greenville. The plant will cost about $45,000.

MILWAUKEE, WIS.—The Milwaukee Gas Light Company has promised to extend its mains into the Jackson Park district as soon as residents there make a demand for such service.

Financial Notes.

Form By-Products Corporation to Furnish Gas to St. Paul Company

The Minnesota By-Products Company, capitalized at $1,000,000 has been incorporated to furnish gas to the St. Paul Gas Light Company. The incorporators named are: R. J. Dodds, of Pittsburgh, and Robert E. Olds and Guy Chase, of St. Paul.

THE PEOPLE'S GAS LIGHT & COKE COMPANY declared a quarterly dividend of 1½%, payable August 25, to stock of record August 1.

THE SPOKANE HEAT, LIGHT & POWER CORPORATION has filed articles of incorporation with a capital of $2,000,000.

THE PACIFIC GAS & ELECTRIC COMPANY reports a gross operating revenue for June amounting to $1,519,517, an increase of $65,557; total net income $678,959, an increase of $23,592; surplus $343,085, an increase of $33,168; gross operating revenues for six months ending June 30, $9,341,500, an increase of $138,002; net income $4,149,614, a decrease of $36,410; surplus available for dividends $2,121,005, an increase of $91,824; surplus after dividends $1,102,028, an increase of $494,577; gross operating revenue for 12 months ending June 30 $18,668,303, an increase of $980,430; total net income $8,322,176, an increase of $486,106; surplus $4,304,591, an increase of $931,736.

THE LOUISVILLE GAS & ELECTRIC COMPANY gross and net earnings for the month of May and for the twelve months ending May 31, 1916, compared with the corresponding periods a year ago, are reported as follows:

Month of May	1916	1915	Increase per cent
Gross	$ 184,080	$ 168,818	$ 9.04
Net	102,628	89,753	14.35
Year ended May 31:			
Gross	2,355,602	2,105,612	11.87
Net	1,394,988	1,114,065	25.22

THE LOUISVILLE GAS & ELECTRIC COMPANY report an increase of 9.68% in net earnings for June, 1916. Comparative earnings for the month are:

	1916	1915	Increase	% Inc.
Gross Earnings	$177,112	$164,446	$12,666	7.70
Net Earnings	98,956	90,216	8,740	9.68
and for the year ended	6/30/16	6/30/15		
Gross Earnings	$2,368,228	$2,125,668	$242,348	11.41
Net Earnings	1,403,728	1,136,380	267,348	23.53

THE WESTERN STATES GAS & ELECTRIC COMPANY report an increase of 6.54 per cent in net earnings over June, 1915, as compared with an increase of 3.96 per cent in the net for the year. Comparative figures for the month and year are:

Month of June	1916	1915	Increase	% Inc.
Gross Earnings	$101,165	$96,294	$4,871	5.05
Net Earnings	50,258	47,171	3,087	6.54
Year ended June 30				
Gross Earnings	$1,215,870	$1,156,117	$59,753	5.17
Net Earnings	582,101	559,953	22,148	3.96

THE CENTRAL INDIANA GAS COMPANY has been showing a rapid increase in gross and net earnings in the last few months. Gross in the year ending April 30 was $761,015; net, $210,650; bond interest $112,119; debenture interest $28,500; surplus $70,031. This surplus is increasing rapidly. It was only $40,889 in the year 1915, but until it has increased further the debentures will be entitled to no more than a medium rating. The company has strong backing and its prospects are good.

THE LACLEDE GAS LIGHT COMPANY reports gross earnings for the 12 months ending March 31 to the amount of $4,592,289.

THE U. S. LIGHT & HEAT CORPORATION, in a circular sent by the management to the stockholders asking for proxies in opposition to the Pressprich-Wilson-Falk Protective Committee, makes the following assertion: "Stockholders can rest assured that the management will elect the majority of the board. This campaign is to enable us to elect a full board in the interests of entire harmony in your board of directors."

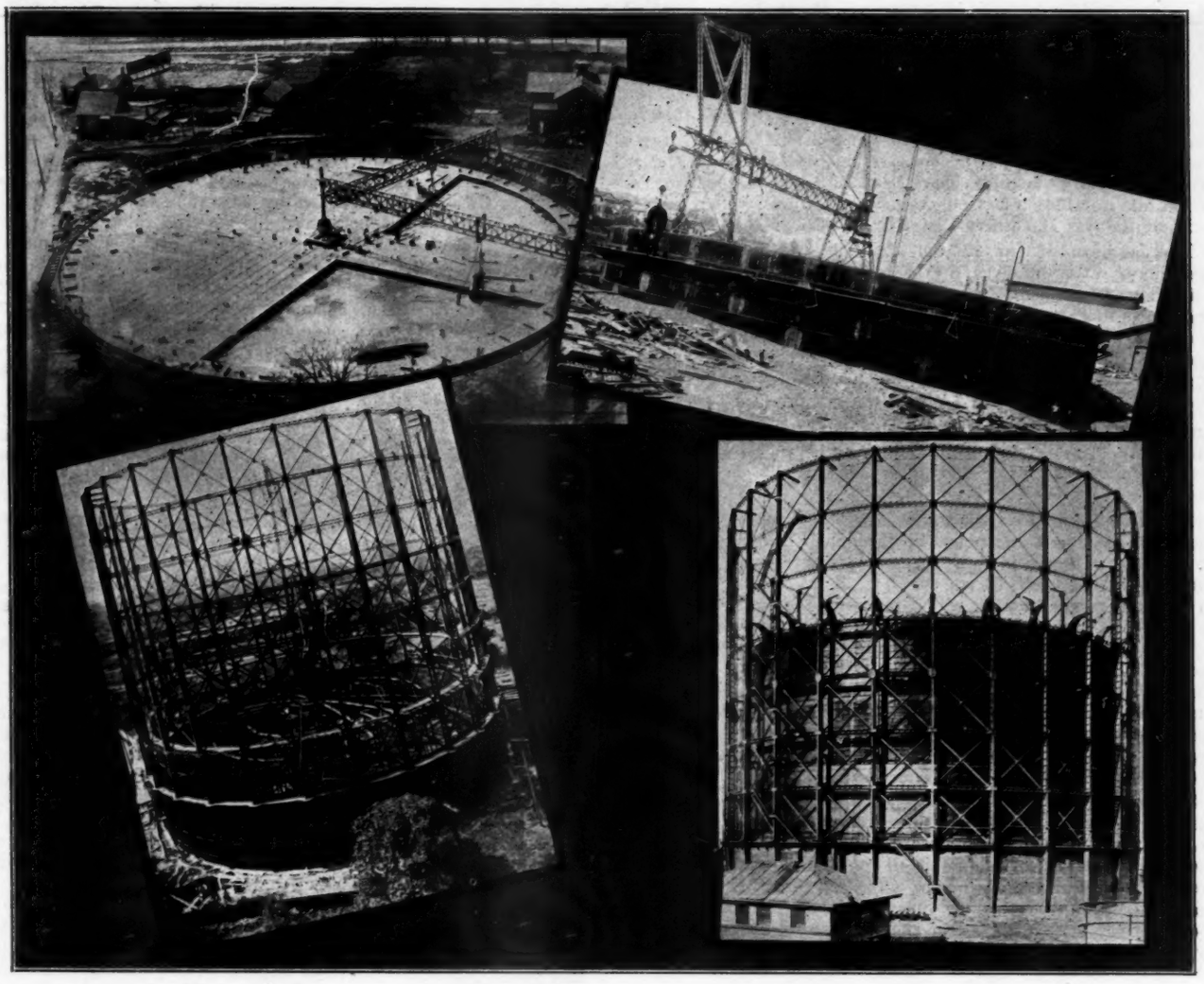
THE BINGHAMTON LIGHT, HEAT & POWER COMPANY, subsidiary of the General Gas & Electric Company, has applied for permission to issue $258,000 first and refunding 5% bonds, and $95,100 6% preferred stock, to be used in the erection of a generating station, sub-station and transmission and distributing lines.

THE DAYTON POWER & LIGHT COMPANY reports gross earnings for June amounting to $115,735, an increase of $39,620; net earnings, $49,558, an increase of $15,971; net income available for dividends $30,449, an increase of $13,911.

Current Prices of Public Utility Securities

	Bid	Asked
Adirondack Elec. P.	24	26
Adirondack Elec. P. pf.	77	80
*American Gas & Electric	142	147
*American Gas & Electric pf.	49	51
American Light & Traction	368	372
American Light & Traction pf.	109½	111
American Power & Light	68	71
American Power & Light pf.	84	86
American Public Utilities	42	47
American Public Utilities pf.	74	77
Amer. Water W. & Elec.	7	8½
Amer. W. W. & E. part'g pf.	15	17
Amer. W. W. & E. 1st pf.	55	60
Carolina Pow. & Lt.	26	30
Carolina Pow. & Lt. pf.	97	*00
Cities Service	302	306
Cities Service pf.	87	88
Colorado Power	23	26
Colorado Power pf.	98	102
Commonwealth, Pr., Ry. & Lt.	62	65
Commonwealth Pr., Ry. & Lt. pf.	84	86
Denver Gas & Electric gen. 5s	97	99
Empire District El. pf.	86½	93
Electric Bond Deposit pf.	85	—
Electric Bond & Share pf.	99½	102
Federal Light & Traction	11	13
Federal Light & Traction pf.	45	49
Gas & Electric Securities	295	—
Gas & Electric Securities pf.	97	102
Northern States Power	86	88
Northern States Power pf.	95	97½
Pacific Gas & Electric	57	59
Pacific Gas & Electric pf.	87	90
Republic Ry. & Light Co.	36	38
Republic Ry. & Light Co. pf.	72	75
*Standard Gas & Electric	15	17
*Standard Gas & Electric pf.	38	40
Tennessee Ry., Light & Power	10	12
Tennessee Ry., Light & Power pf.	49	51
Toledo Trac., Light & Power	50	52
Toledo Trac., Light & Power pf.	86	88
United Light & Railways	50	52
United Light & Railways 1st Pf.	74	77

*Par value $50



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HINMAN DRUM STATION METERS, FOULIS GAS GOVERNORS
PREPAYMENT METERS

REPAIRING AND CONVERTING

PROMPT SHIPMENTS - - - - CORRESPONDENCE SOLICITED

New Coke Ovens at Terre Haute Have Distinctive Features

Gas Burns in Two Adjacent Flues in a Continuous Direction, and Upon Reversal Burns in the Opposite Direction—Oven is of Vertical Flue, Cross Regenerative Type with Gas Burners Located Near Top.

The development of the by-product coke-oven has brought a pretty well-defined standardization of design, the distinctions between the several recognized types lying in the arrangement of flues in vertical or horizontal position and the manner of heating the gas and air, or both. The *Iron Age*, in a recent issue, describes an installation having distinctive features, which is being built by the Gas Machinery Company at Terre Haute, Ind.

The gas burns in two adjacent flues in a continuous direction, and, upon reversal, burns in the opposite direction in contrast with that arrangement of gas flow which provides for the burning of the gas in groups of from 5 to 15 adjacent flues, the products of combustion passing out of the next group of a like number of flues. A continuous flame, also, is maintained in this oven in all of the gas heating flues irrespective of the direction of the flow.

The oven is of the vertical flue cross-regenerative type. The gas burners are located near the top of the oven. The flow of gas, air and products of combustion may be traced from the accompanying cross-section cut of the combustion chamber of the ovens.

Referring to the drawing, the air for combustion enters through the waste gas flue *A* and passes up through *B* into the regenerator *C*. The air is heated in these regenerators by flowing horizontally through hot checker brick to the vertical flue *D*, air flue *S* and so into the regenerator *T*, which takes up the heat of the gases on their way to the stack through the waste gas flue *W*.

Upon reversal the flow is, of course, in exactly the opposite directions, and in this connection it is to be noted that the reversal does not take place from one side of the battery to the other, but simply from one flue to the adjacent flue. In short, the arrangement of flues and the flow of gases suggests a consideration of this oven as a combination of several ovens, each being independent of the other.

The gas is burned in the flues, it is noted, with a long soft flame, which floats from the point where the air and gas meet to a corresponding point on the adjacent flue; that is, all of the gas heating flues carry a flame at all times, even though the direction of flow is reversed, and an unusually even distribution of heat is accordingly the result. The length of travel of flame and hot gases is the same in all of the flues and on account of this fact uniformity of draft on any one flue or set of flues is obtainable and concentration of heat at any one portion of the oven prevented. On account of the uniformity in the heat, less power, it is found, is required for pushing the coke and the strain on the oven walls is less with increase in the life of the oven. For this reason the oven may be operated without regulation from which the hot air passes into the horizontal flue *S*. Thence the heated air rises through the ports F into the vertical flues *G* and out through the ports *H*, where it meets the fuel gas entering through the gas inlets *J*. Combustion takes place down the vertical flues *K* and up through the parallel flues *L*. The waste gases then pass downward through the ports *M*, the flues *P* and the ports *R* into the horizontal flue *E*, which parallels the hot of gas or air in individual flues. Means of regulation are, however, provided for both gas and air, so that the uniform distribution of heat with a minimum gas consumption may be insured.

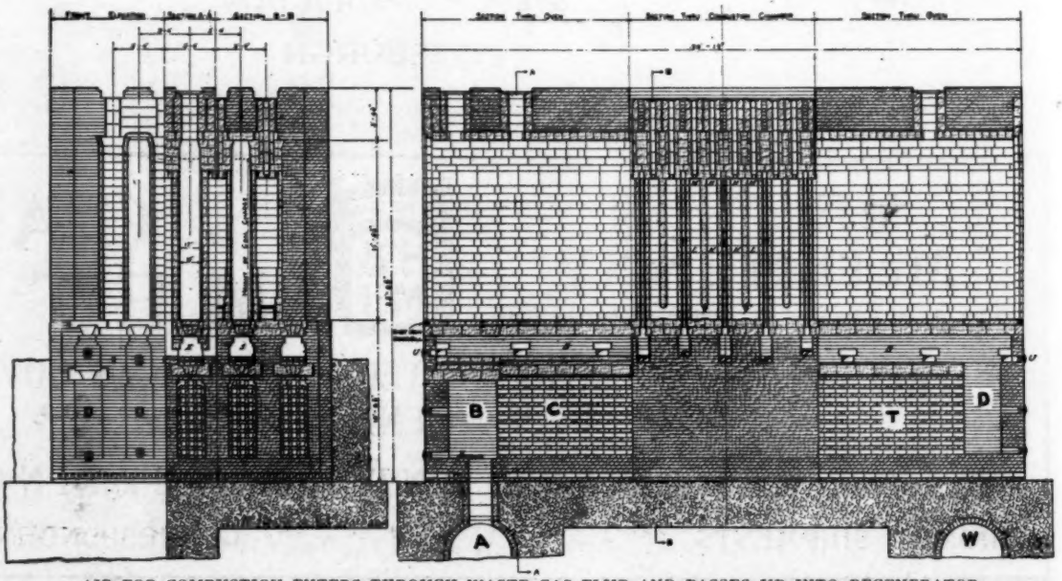
On account of the difference of 2½ in. in the width of the coal charge between the pusher and coke sides of the oven chamber, it becomes advisable to regulate the amount of gas and air in different flues according to the thickness of coal at that point. Each gas inlet port is equipped with a spring bushing, which may be turned with a key, thus opening or closing the port to the desired amount. In the horizontal flues *E* and *S*, under the oven sole, sliding brick are provided with which ports *F* and *R* may be throttled. In addition, a damper *Z* is provided in flue *B* with which the draft on individual ovens may be regulated. In connection with regulation, adequate means for inspection of the combustion are provided, openings covered with cast-iron plugs are located at the top of the battery over the gas flues, and inspection holes are provided at each end of the flues *E* and *S* and just above the damper *Z*.

The fuel gas main is carried near the top and at the end of the battery and connections to the individual gas manifolds are made from this point. These gas manifolds are built in flush with the tops of the ovens and are properly constructed to take care of expansion. The gas inlet port is located in offsets from these manifolds. In the oven walls there are no horizontal flues; all the flues are vertical and the walls may be considered as a beam which is held rigidly at the top and bottom.

Though the direction of flow of the flame is reversed, yet the gas is not off of any heating flue at any time and each heating flue carries a flame at all times. The gas being floated in, it is claimed that the flame does not impinge against or damage the brickwork in any way.

Adjustment of the gas supply to individual flues is made at the top of the battery. If the gas supply port should become plugged, it is accessible and within easy reach of the operator. The adjustment of the gas inlet port is so designed that if it became necessary to punch carbon out of the port where the gas and air meet, this might be done without disturbing the regulation of the gas supply. The location of the gas supply ports, it is emphasized, is such that the tendency to form carbon in them is reduced to a minimum, the temperature at this point being insufficiently high to decompose the gas.

With the regenerators of the Gas Machinery oven located directly under the coal charge and the diffused heat from the regenerator transmitted to the coal during the coking period, the regenerators are so-called "cross regenerators," and may be likened to a hot blast stove lying on its side. The waste gases sweep through from one side of the regenerator to the other, and a greater recovery of heat is claimed than in types of regenerators where the gas has a short vertical travel.



AIR FOR COMBUSTION ENTERS THROUGH WASTE GAS FLUE AND PASSES UP INTO REGENERATOR